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A STUDY OF NEW TOWN ELEMENTS, COSTS, AND LAND USE CRITERIA

August 20, 1969

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Office of Planning Coordination
Bureau of Functional Coordination

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Introduction

This report details estimated land areas and development costs for a new town of about 100,000 population. The estimation requires identification of the major components for a new town and of the cost involved in acquisition and construction of land and buildings. The estimation also is based on some assumed averages for new area development factors in New York State, involving such elements as family composition, school sizes, land cost, etc.

At the end of this paper after the summary of development costs has been provided, an effort has been made to divide this cost into public and private components, with discussion of implications for the financing problem.

In developing these estimates a number of major assumptions have been made: (1) The new town would be located close to or within a metropolitan area. In this setting it would partially employ its own residents and in addition send a great deal of its labor force to other locations in the metropolitan area. (2) The central shopping area of the new town would act as a magnet for surrounding areas and thus provide employment for new town labor force as well as labor from these surrounding areas. (3) To arrive at some cost estimates, averaging of components has been done. Consequently, variations with regard to such factors as low, middle and upper income housing has been factored out by the assumption of average cost. Similarly varying land costs induced by topographic changes, have been omitted on assumption of a level terrain. Assumptions of terrain variation would result in cost increases.

This paper does not deal with several subjects that are commonly included in studies of new towns. For example, it does not deal with the overall objectives by which new town development generally is justified. It does not deal with problems of minority groups or metropolitan areas that might be met by construction of new towns. It does not deal with the arrangements of local government that are necessary for the construction and future operation of such towns. It does not deal with the improvements or felicities of design that may be obtained by new town construction. It does not deal with the whole problem of the phasing of construction in the development process.

FINDINGS

This paper will enumerate essential new town components and the scope of resource allocations necessary to properly support a new town of 100,000. Here the results of this investigation's conclusions concerning population; land area; cost of land and buildings; and the public/private components costs will be outlined in a brush-stroke manner.

POPULATION FACTORS

The objective of this section will be to provide the perspective to a planner that will allow him to gauge the complexity of new town undertaking. Establishment of a population base is the first step in planning for a new town.

It was presumed that the bulk of the town's families would be young marrieds. A family size of 3.6 persons per unit was chosen on this basis. Each family would have 0.6 elementary school children, 0.26 junior high school aged children, and 0.2 children in senior high school. This percentage per 1,000 population will produce a heavy elementary school enrollment 16,800; less than one-half that average in junior high 7,280; and 5,600 children in senior high school.

The parents of these children would be within the general range of 25 to 55 years of age. Forty per cent of the population will be employed; of this 40,000, one half (20,000) will be working in the town itself. Of this 20,000 persons, 30% or 6,000 will be engaged in manufacturing and warehousing. The remainder of 14,000 will work in commercial enterprise in the town, public employment sector, and professions.

It is assumed that there will be an initial dependency by the town's population upon their former city where their jobs are. Gradually, however, there will be developed a two-way flow of jobs for people in the existing city and the new town.

The new town's population characteristics are those of a young, growing community that will demand high quality services from government. To provide these opportunities for its citizens a new town must find the number of school children, workers and those creating environmental pollution control problems. A high level of publically financed infrastructural elements must then be introduced to satisfy their needs.

LAND AND DENSITY

The new town will occupy 11,146.5 acres including transportation and a protective greenbelt. Total town area is 11,146.5 acres or is 17.26 square miles including a greenbelt. There are 7,431 acres in urban development or 11.61 square miles of urban area including a transportation component.

There will be 28,000 housing units in this community with an average net residential density of 8.46 units per acre. Seventy percent of the new town's housing units [19,600] will be the single-family detached type at seven to the acre. The remaining thirty percent will be divided between row houses [4,200 units] at 14 per acre and multi-family high rise at 20 per acre [4,200 units]. These housing types and densities reflect current buyer desires with the introduction of more intense uses of land through higher densities in Planned Unit Development for row and multiple family housing.

COST OF LAND & BUILDING

Total land acquisition costs will be $22,314,000 for both private and public sectors. The private sector's share will be $7,897,000, the public's $14,417,000. Construction and site development costs will be $778,204,680 for private development and $674,652,980 for public construction and site development. The cost for private land acquisition will be $7,897,000 and $778,204,680 for construction and site development. Total private costs then will be $786,101,000. Public land acquisition will be $14,417,000 and construction and site development $674,652,980. Total public costs will be $684,569,980. The entire new towns cost for acquisition and development will be $1,470,670,980.

The cost of new town of 100,000 is $1,470,670,980 and size 17.26 square miles is an indication of the scope of a project of this sort. A large amount of public investment will have to be planned to engender a first step response by the private sector. Omitted here are the investments of furnishing homes and machinery for plants as well as the new taxes contributed by such a development.

Undertaking a new towns project of this scale, 100,000 persons will require coordination, foresight and finally, a large expenditure of public funds to create a more rational settlement pattern. This job must be undertaken because without it random development of the same amount will occur but without the saving involved in the economies of scale available in a new town.

Organization

There are four parts to this paper following this introduction. The first is a summary of findings reached which includes an analysis of population characteristics, local area, cost of land and buildings, and public versus private component costs.

In the analysis or second section residentially centered elements are discussed, they include: housing; primary and secondary schools; community colleges; park and recreation; cultural facilities; churches; and health-social services.

The third section deals with employment related factors and their components. The new town's industrial sector is described. The commercial element is described in an hierachy that goes from neighborhood shopping centers to the town center. Finally a section dealing with necessary public buildings covers combined fire and police stations and municipal offices.

The fourth part discusses the general services needed for operation of the town as a whole. These include roads and a transportation center; utilities; water supplies; and cemetaries.

Part five is an analysis of the public and private split that must be established to plan the building of a new town.

By utilizing this framework it is possible to see the outline of a cost structure for such a project. Finally the necessary functions of a new town have been sketched.

Part six is an analysis of those components of total development cost that we should expect private enterprise and government to supply.

The public can see how State expenditures of this sort would generate significantly more investment than it put forth.

Housing

Three basic housing types will appear in this town: single family ranch; row-clustered; multi-family high-rise. Median construction costs per unit have been obtained for each type. Total costs are the result of multiplying and summing by the number of units for each type.

A basic assumption is that a new town to be financially successful must also take into account new site planning concepts. Planned Unit Development (PUD) is one of the more moderate of these relatively recent design innovations. It will be a part of the overall strategy behind this new town.

In this community, 70%, about 19,600 units, of the net residential development will be devoted to single-family detached dwelling units. The remaining 30% will be equally divided between row and multiple-family dwelling units, giving 4,200 to each.

The justification of 70-30 distribution is an attempt to create a new town that will have consumer acceptability. At this time it is assumed that if financing were available and at reasonable rates the public would continue its past preferences for single-family homes. However, the 30 percent of this new town devoted to row and multi-family high rise is the beginning of an attempt to create demand for these housing types in a well designed setting.

As noted earlier in the population section, family size for the purposes of this study is 3.6 persons, yielding a need for 27,777 units, or about 28,000.[1]

The residential component of the new town will have a net density of 30.5 persons or 8.46 families per acre, occupying 3,310 acres. This density was obtained in the following way:

Single-family houses will be built at a density of 7 per acre. The overall land requirement for 19,000 units is thus 2,800 acres.

Row houses will be built at a density of 14 families per acre. The overall land requirement for 4,200 units will be 300 acres.

Multiple-family structures will be built at a density of 20 families per acre. The overall land requirement will be 210 acres.

It should be noted that the average costs for all three types of housing incorporate both more and less expensive types so that there can be a range of provision for upper, middle and lower income groups. In the same vein, square footage allowances are modest so that these figures can act as a benchmark or average for both large and small families, in line with current FHA minimums.

For single-family homes, the most expensive building type, ranch-type homes, were selected on a modest square footage basis. This selection enables a planning team to judge the upper cost limits of a housing program, which will attract many middle and upper middle income buyers. The purpose of this combination was an attempt to reflect current buyer preferences.

Current cost per dwelling unit for a single-family detached house is $23,000. This New York State median construction cost for a ranch-type home includes a one-car garage
Where union wages are involved, according to the FHA, 15% must be added, bringing construction costs to $25,800.[2] With these units total cost would be $507,580,000. They will have a ground coverage of 600 square feet per floor with a basement/garage of equal footage. The median cost for a 1200 square foot row house is based on $11.30

per square foot. With the addition of a one-car garage, this housing module will cost $14,000 exclusive of land. Payment of union wages and builders' profit would raise costs by 30%, bringing the per unit price to $19,240.[3] Total cost for these units is $80,262,000.

The multi-family moderate high-rise (6-story) apartment house will be an integral part of this new town. It will comprise the remaining 15% of the residential sector. Current New York State costs per square foot are $17.00, including prevailing union wages. The median sized apartment contains 900 square feet and has one parking space allocated to it for each bedroom.[4] The cost per dwelling unit for each apartment will be $15,300, including parking and related site development costs. Total cost for these units is $64,260,000.

These figures do not include the cost of land which is included in the section dealing with total site acquisition costs.

HOUSING SUMMARY

Housing Type	Numbers of Units	Cost Per Unit	Total Building Costs	Acreage	Population	Net Densit
Single Family	19,600	$25,800	$507,580,000	2800	70,560	7
Row	4,200	$19,240	$ 80,262,000	300	15,120	14
Multi-Family	4,200	$15,300	$ 64,260,000	210	15,120	20
Totals	28,000		$652,102,000	3310	100,800	8.46

Housing Footnotes

1. A new town such as this would have a higher family size than normally found in the State.

2. Interview with Mr. Smith Albany Office of Federal Housing Administration, May 2, 1969.

3. Interview with Mr. Smith Albany Office of Federal Housing Administration, May 1, 1969.

4. Interview with Mr. Smith Albany Office of Federal Housing Administration, May 1, 1969.

Schools

In this section we will estimate the costs of school facilities. To do this we must identify the number of school children in the various grades, calculate the number of schools necessary to educate them and the land area required.

Potential private, parochial and other religious school enrollment will not be covered by this analysis. To the extent that such facilities are constructed, public costs for school construction will be diminished.

Median family size in this new town is 3.6 persons. It has been estimated that there will be 0.6 elementary school children per family in this new town. Calculated on a base of 28,000 families there will be 16,800 children of elementary school ages.

The median number of children per family who fall within the junior high school age bracket will be 0.26. This community then will have 7,280 children in the 12-14 years of age group.

Finally, there will be a median number of 0.2 children per family in the 15-17 year old group. Thus, 28,000 families will have 5,600 children in senior high school.

The current New York State enrollment standard for elementary schools is 600 pupils per school with a gross area of 9 1/2 acres each. Costs for construction will be $2,000 per pupil. Based upon these standards this new town will need twenty-eight elementary schools occupying 266 acres. Total elementary school costs will be $33,600,000. This excludes land acquisition which has been previously paid by the new towns corporation.

Employing a junior and senior high school combination 1,840 pupils will be taught in each complex. Each combined school will occupy 30 acres therefore the seven secondary schools necessary for this new town will occupy 210 acres.

Building costs for both junior and senior high school students will be $3,300 for each pupil. The 12,880 secondary school students will require building and site development costing $42,504,000.

Total building costs for both the primary and secondary schools will be $76,104,000. They will occupy 476 acres in thirty-five buildings.

SCHOOLS-SUMMARY

School Type	N.Y.S. Schools Standard Costs	Nos. Pupils	Nos. Units	Total Acres	Cost
Elementary Schools	$2,000 per pupil	16,800	28	266	$33,600,00
Junior High School	$3,300 per pupil	7,280]	7	210	$24,024,00
Senior High School	$3,300 per pupil	5,600]			$18,480,00
Total		29,680	35	476	$76,104,00

Schools Footnotes

1. Figures arrived at by interpolation from New York State opulation haracteristics, U.S. Census of Population, 1960.

2. Figures arrived at by interpolation from New York State opulation haracteristics, U.S. Census of Population, 1960.

3. Figures arrived at by interpolation from New York State population characteristics, U.S. Census of Population, 1960.

4. Report, School Site Standards & Site Selection, the University of the State New York, State Department of Education, Division of Educational Facilities; p. 2

5. Comfort, Kenneth, preliminary report on New Towns, OPC, 1968, unpublished, pp. 4-5.

6. Comfort, 4-5.

7. School Site Standards & Site Selection, P. 3

8. Comfort, 4-5.

Community College

This section will show the acreage, number of pupils, and cost of a community college for a new town of 100,000. The cost of structures equipment, and an overall expansion figure are built into this estimate. It is assumed that this type of educational resource will be a necessary infrastructural element. Middle and other class aspirations at this time require the introduction of this element. It will serve as a means of attracting and keeping middle class residents, while providing educational opportunities to the poor.

Enrollment in a two-year community college from both the community and surrounding area will be 1,800 persons in day sessions.[1] A minimum of 100 acres will be needed for a campus. Current building costs are $7,400 per student; based on $46.28 per square foot for 160 square feet per student.[2] Total building construction will run $13,320,000 for 288,000 square feet. Site development including utilities for a 100 acre campus is computed on the basis of $1,500 per pupil.[3] These campus site development costs will be $2,700,000. Total costs then will be $16,020,000 for buildings and site development costs for a 100 acre campus.

COMMUNITY COLLEGE COSTS: SUMMARY

Number of Pupils	1800
Area	
Buildings	(6.6 acres) or 288,000 square feet
Site Development	93.4 acres
Total	100 acres
Costs	
Buildings	$13,320,000
Site Development	2,700,000
Total	$16,020,000

Community College Footnotes

1. Based on an estimate of the number of pupils potentially in a town of 100,000.

2. Interview with Ellis M. Rowlands, Director of Community Colleges Facilities Planning August, 1969.

3. Interview with Ellis M. Rowlands, Director of Community Colleges Facilities Planning August, 1969.

Public Parks/Recreation Facilities

This section is designed to provide the planner with benchmark data on average State costs per acre for park lands. In addition, a system of standards for recreation facilities will be presented. Knowledge of these two elements should allow planners to produce both standards for development and their costs in conjunction with other variables such as local land costs.

The scope of this section will be to provide cost figures for block, neighborhood and community-wide recreation facilities. Park land will be described as a ratio per 1,000 population.

Private, profit making recreational activities will not be included in this report. These are found in the town's commercial square footage figures as a design feature.

The design of this new town envisions a system which clusters community facilities in central area for each neighborhood or village. Park lands then are adjacent to the school facilities and shopping centers. Park lands and recreation areas would be linked to one another throughout the town, constituting a separate and continuous pedestrian circulation system.

This system of parks and recreation facilities represents an average development cost of $10,000 per acre.[1] At this time it is possible to show only a reasonable development cost, supported by advice from practicing recreation consultants. Our objective is to provide recreation standards and their cost implications as a benchmark for further work as each new towns situation arises.

Parks/Recreation Facilities

The standards used are applied to the low density area with 70,000 population and the medium and high density areas with 15,000 population each.[2]

Tot Lots - The standard used here is one half acre per thousand population, with development costs at $10,000 an acre for standard development.

Low Density	35 acres	$350,000
Medium Density	15.0 acres	$150,000
High Density	15.0 acres	$150,000
	65.0	$650,000

Playgrounds - The standard utilized here is 1.5 acres per 1,000 population, with development costs at $10,000 an acre for standard development.

Low Density	105 acres	$1,050,000
Medium Density	22.5 acres	$ 225,000
High Density	22.5 acres	225,000
	150.0	$1,500,000

Neighborhood Parks - The standard employed here is 2 acres/1,000 population with development costs at $10,000 an acre for standard development.

Low Density	140 acres	$1,400,000
Medium Density	30 acres	$ 300,000
High Density	30 acres	$ 300,000
	200	$2,000,000

Playfields - This standard used here is 1.5 acres/1,000 population, with cost and acreage figures included in school figures, and development costs at $10,000 per acre.

Low Density	105 acres	$1,050,000
Medium Density	22.5 acres	$ 225,000
High Density	22.5 acres	$ 225,000
	150	$1,500,000

Community Parks - 3.5 acres/1,000 population, with development costs at $10,000 per acre.

Low Density	245 acres	$2,450,000
Medium Density	52.5 acres	$ 525,000
High Density	52.5 acres	$ 525,000
	350.0	$3,500,000
Two Golf Courses	400 acres	$1,600,000

SUMMARY

Tot Lots	65 acres	$ 650,000
Playgrounds	150 acres	$1,500,000
Neighborhood Parks	200 acres	$2,000,000
Playfields	150 acres	$1,500,000

SUMMARY continued

Community Parks	350 acres	$3,500,000
Golf Courses	400 acres	$1,600,000
Totals	1,315 acres	$10,750,000

Public Parks/Recreation Facilities - Footnotes

1. Developed in conjunction with Vollmer Associates representative May, 1969 based upon a cost of $5,000 per acre for seeding with other basic amenites figured at an additional $5,000 an acre.

2. George Nez: Standards for New Urban Development -- the Denver Background Vol. 20 No. 5. Urban Land Institute, Washington, D.C.

Cultural Facilities

A new town should have cultural facilities that will enable it to attract and retain persons who form a part of an overspill from a large metropolitan agglomeration. This report will identify those major publically financed cultural facilities necessary for a city of 100,000 that has as one of its goals the fostering of a sense of urbanity. To provide a workable modular system, costs for these facilities must be enumerated.

This section will show the cost of libraries and a performing arts center. Omitted are museums and convention halls as it is not possible without an exact location in mind to predict either the necessity or size of these elements when they might best be located in a larger city.

The variety of possible types and sizes of cultural facilities across New York State indicates that there are few reliable-fixed standards by which to judge the amount of square footage supported by a new town of 100,000. However, by utilizing the building costs of the State University at Albany we are able to arrive at an approximate series of standards for each infrastructural element considered necessary for a cultural center.

One performing arts building which can serve several artistic uses at one time could encompass 35,000 square feet of floor area at $36.80 per square foot, should cost $1,288,000 for the building. Additional lot area costs are calculated at 2 times the building's square footage or 70,000 square feet, at $3.20 a square foot, or $224,000 for site preparation.[1] Total cost then would be $1,512,000.

Four village libraries will be built, each on a 60,000 square foot site, with buildings containing 60,000 square feet of floor area, 30,000 feet each floor.[2] Site development costs for the 30,000 square feet not built upon will be $3.20 a square foot.[3] Thus each village library site construction cost will be $96,000. Building costs for each village library are estimated at $30 a square foot of floor area. Thus each building would cost $1,800,000 with total site and construction costs coming to $1,896,000. The four village libraries would cost $7,584,000 in total.

One main library with a reference center would be built in the town center. This library would have a 120,000 square foot site with 120,000 square feet of floor area on two floors. Site and building construction costs would be double those of a village library, coming to $3,792,000.

The total cost of libraries would come to $11,376,000. The total cost of cultural facilities would come to $12,888,000.

CULTURAL FACILITIES SUMMARY

Number of Buildings	Type	Total Site Acres	Site Dev. Costs	Build. Con. Costs	Total Dev Costs
1	Performing Arts	2.4	$224,000	1,288,000	1,512,000
5	Library	8.3	576,000	10,800,000	11,376,000
Total: 6		10.7	$800,000	12,088,000	12,888,000

Cultural Facilities: Footnotes

1. Interview with Walter Tisdale - Architect SUNY, May, 1969

2. Interview with Walter Tisdale - Architect SUNY, May, 1969

3. This cost for site development will be used throughout this new town.

Churches/Houses of Worship

The objective of this section is to identify the number of churches required for a town of 100,000. Site development and building costs will also be shown. Total costs and land area concerned are an important part of a new towns study, as religious needs must be considered to be an integral part of a community's social fabric.

Each house of worship in this town will draw upon 1,500 persons for its congregation.[1] At 3.6 persons per family these 416 families will be supporting one church. These houses of worship will serve the approximately 60% of the population that will be presumed to be attending services.[2] The total population to be churched then will be 60,000. There will be 40 churches to serve them.

There will have to be 20 square feet per member for each church.[3] Each church will have 30,000 square feet of building. Total number of square feet in churches will be 1,200,000 square feet at a cost of $30 per square feet.[4] Building costs then will be $36,000,000.

Site development costs will be $3.20 per square foot for an area of 2,400,000 twice the building area.[5] Total site development costs will be $7,680,000.

Total costs for these churches will be $43,680,000 for buildings and site development comprising 83 acres.

Churches/House of Worship
SUMMARY

Costs		Square Feet	Acres
Buildings	$36,000,000	1,200,000	27.5
Site Improvements	7,680,000	2,400,000	55.0
Totals	$43,680,000	3,600,000	82.5

Churches/Houses or Worship: Footnotes

1. Joseph DeChiara and Lee Koppelman - Planning Design Criteria [New York: VanNostrand Reinhold, Co., 1969], p. 193.

2. DeChiara and Koppleman, 193.

3. Interview with John Roberts - OPC - who is currently helping to build a church in the Albany area. Albany, August 14, 1969.

4. Roberts,

5. Site development costs the same as in the rest of the new town.

Cemeteries

The objectives of this section is to provide for a need inherent in any community. The number of burials that might occur, the amount of space necessary for this service and development costs per acre will be enumerated here.

Over the period of fifty years it is possible to have a maximum 51,500 burials in a new town of 100,000.[1] Cemetery space calculated on the basis of a park lawn type will require 26 acres.[2] Development costs for a cemetery of this type are $2,000 per acre.[3] Thus over a 50-year period the maximum costs will be $52,000.

Cemetaries

1. Interview with Art Cramer, New York State Department of State, Albany, N.Y., May, 1969.

2. Cramer, May 1969.

3. Cramer, May 1969.

Health

This section will identify those public health facilities and their costs necessary for a new town of 100,000. It is assumed that government will view both preventive medicine and hospital care as within its purview paying for the cost of clinics and a hospital complex. Private medical arts buildings and nursing homes will be exlcuded from these cost figures as they are in reality commercial enterprises.

A new community of 100,000 persons will require a definite hierarchy of health service ranging from clinics to hospitals. These facilities are a necessary component of a well balanced scheme.

There will be one clinic per 10,000 population each built on one acre in a neighborhood center and also one clinic in the town center.[1] Approximately 8,000 square feet of floor area will be needed for each clinic at a cost of $24.80 per square foot (similar to the cost of a nursing home).[2] Total cost then will be $19,840,000 for 80,000 square feet including equipment. There will be no parking costs as these clinics will be constructed adjacent to neighborhood shopping centers. Total cost then will be $19,840,000 for outpatient clinics occupying ten acres.

A hospital will also be required for a new town of 100,000. At a standard of four beds per 1,000 population a 400 bed hospital would be required.[3] Assuming the need for landscaping and rest areas on the ground, 40 acres would be required.[4]

A 400 bed hospital has 80,000 square feet which would cost $200 per square foot for construction.[5] Total cost then would be $16,000,000 for plant and equipment.

The provision of a sufficient level of medical and hospital services is vital to a new town. Providing these services will enable it to compete for people with nearby metropolitan areas.

Total costs for Health/Social Services facilities will be:

Health Cost: SUMMARY

	Cost	Acres
10 Outpatient Clinics	$19,840,000	10
400 Bed Hospital	16,000,000	40
Total	$35,840,000	50

Health

1. Nez, George, 3
2. Interview, Department of Mental Hygiene, May, 1969.
3. Nez, George, 2.
4. Nez, George, 2.
5. Mental Hygiene, May 1969.

Development Costs Associated with Employment

This new town located within a metropolitan area will provide manufacturing sites and employment for a significant portion of its residents and for nearby communities. The town is not intended to be the major employment center. It is likely that a considerable exchange of commuters will occur with the likelihood that the greater commuting flow will be outward from the town to the central city and nearby metropolitan employment centers. Still many town residents will be employed in it, and should be as town development will offer manufacturing advantages as well as accessible commercial and service employment opportunities in the town itself. For these reasons an initial determination has been made that employment opportunities in the town should be equivalent to about one-half the size of its labor force, with the jobs to be filled by both town residents and non-residents. All cost figures for manufacturing, commercial and service area development therefore are based on providing employment for a group equal to this fifty percent of the labor force. This would be an initial employment development determination. If at any point the desirability of this estimate were questioned, the figures could be changed or allowance for growth or reduction of employment and associated costs could be made at a later period of development.

Distribution of Employment by Type

Forty percent of the town's population will be employed, roughly 40,000 people.[1] With employment for half this number to be established in the town, we must determine what types of

employment these 20,000 people will have and the land acquisition and building construction costs required for this employment. United States Census data for New York State in 1960 shows that thirty percent of the employed were in manufacturing and warehousing with the remainder in commercial, service, governmental and professional establishments.[2] This percentage division of employment will be used for land acquisition and construction costs for employment facilities

Manufacturing and Warehousing Land Acquisition and Construction Costs

Thirty percent or 6,000 people will be employed in the town in manufacturing and warehousing. At 16 workers per acre in light industry, a density found in industrial parks, 375 acres of land will be required for manufacturing and warehousing operation.[3] Twenty percent of this land, 75 acres, will be needed for roads. Of the remaining 300 acres, one-third, 100 acres or 4,356,000 square feet will be covered by buildings.[4] The remaining 200 acres will be used for accessory site development purposes.

As road costs for the town as a whole are handled in a separate section, in this section development costs for only 300 of the 375 acres in the manufacturing and warehousing area will be presented.

The 100 acres, 4,356,000 square feet, of land in buildings will be constructed at a median cost of $12 per square foot, or a total of $52,272,000.[5]

The 200 acres used for other site purposes, can be developed at a cost of $5,000 an acre or a total of $1,000,000.[6]

Total site development costs for manufacturing and warehousing exclusive of roads, thus would amount to $53,272,000.

MANUFACTURING & WAREHOUSING USES -- SUMMARY

Costs	Industrial	Total Cost
Buildings	$52,272,000	$52,272,000
Other Site Improvements	1,000,000	1,000,000
Total Costs	$53,272,000	$53,272,000

Acreage	
Gross Salable Area	100 acres [4,350,000 square feet]
Site Development	200 acres
Roads	75 acres
Total	375 acres

Cost	
Gross Salable	$12 per square foot
Site Development	$5,000 per acre

Industrial Development Costs Associated with Employment: Footnotes

1. Nez, George, 5.

2. Considering the 1960 work force composition it was decided that 30% manufacturing and warehousing employment was reflective of the state as a whole. Retail and commercial, office employment, government, teaching and other essentially service industries make up the other 70% of the work force. Reflected in the 1963 Census of Business and Manufacturing.

3. Nez, George, 5.

4. Urban Land Institute, Community Builders Handbook, Washington, D. C., 1968 ed., p. 462.

5. Cost per square foot of industrial spaces was given as between $10.72 for Rochester SMSA and $10.03 in Albany, Troy, Schenectady SMSA for 1966. Addition of a 5% per year factor to $10.50, the medium cost at Buffalo, for 3 years raised costs to $12.07 which was rounded off to $12. (Source: Building Costs-Boeckh Residential Service April 1968; Vol 25: 7-1-68.)

6. Community Builders Handbook, 460.

Commercial

This section will identify the amount of commercial space necessary for a town of 100,000. It will show the standards utilized to determine commercial space needs, on-site improvement costs, and total commercial building costs. Commercial space will be divided among neighborhoods and the town center.

Neighborhood Shopping

Neighborhood centers include shopping and other facilities within walking distance of 5,000 persons. Urban Land Institute standards are used for distributing neighborhood shopping among four villages of 25,000 population each. However, 5,000 people from each of these units will be in higher density housing clustered around the town center which will serve their commercial needs. Therefore, each village needs shopping space to serve 20,000 people.

The standard utilized here includes building, parking and other site improvement area. For the 80,000 population served neighborhood facilities, this would require 80 acres at a standard of one acre per thousand.[1] One fifth of these 80 acres or 16 acres would be covered by buildings. The remaining four fifths, 64 acres, would be used for parking area and other site improvements.

Commercial area costs then would be calculated as follows:

(a) 16 acres of neighborhood shopping, 696,960 square feet at $10.10 per square feet of gross leasable area = [$7,039,296] $7,000,000 for construction of buildings.[2]

(b) Other site improvements including parking area, 64 acres x $3.20 a square foot = [$8,921,088] $8,900,000.[3]

Town Center

The standard used to determine this shopping area is 0.75 acres per 1,000 population.[4]

For a community of 100,000 there should be 75 acres. Using a 4:1 parking ratio there are 15 acres of gross leasable floor area at $10.60 per square foot [653,400 per square foot].[5] The gross leasable area should cost $6,926,040. On-site improvements for 60 acres at $2.40 per square foot should cost $6,272,640.[6]

Total Commercial Costs

Total cost for buildings in commercial uses will be $13,926,040 and other site improvement will cost $15,172,640. Total cost for 155 acres of commercial area with parking at a 4:1 ratio is $29,096,680.

Commercial Uses -- Summary

Costs	Neighborhood	Town Center	Total Cost
Buildings	$ 7,000,000	$6,926,040	$13,926,040
Other Site Improvements	$ 8,900,000	$6,272,640	$15,172,640
Total Costs	$15,900,000	$13,198,680	$29,098,680
Acreage			
Gross Leasable Area	16	15	31
Site Development	64	60	124
	80	75	155
Cost Per Square Foot			
Gross Leasable Area	$10.10	$10.60	
Site Development	$3.20	$2.40	

Commercial: Footnotes

1. Nez, 5.
2. Community Builders Handbook, 398.
3. Community Builders Handbook, 398.
4. Nez, 5.
5. Community Builders Handbook, 398.
6. Community Builders Handbook, 398.

Public Buildings

A new town's municipal government will provide basic governmental services such as police, fire protection, road service maintenance, municipal registry, etc. A decentralized administrative and technical services organization is envisioned for this community.

To facilitate the efficiency of these decentralized facilities, their offices will be combined in single structures dispersed one to each of the four villages of 25,000 persons. Each decentralized structure will serve as a small city hall for villages of 25,000. At this time the construction of multi-utilized structures such as this has been tried by small rural villages.[1] Use of these data along with one overall square footage figure for a road service depot will enable the new town planner to outline the approximate cost of providing these facilities.

Each 2-story combined fire-police station and municipal offices cost can range between $125,000-$225,000.[2] There will be four of these stations at cost of $900,000 (at $225,000 each). In addition, as a city of this size must have a minimum of 13 stations, nine other police-fire stations, one story buildings, will be necessary at $125,000 each for a cost of $1,125,000.[3] Cost of all of these then without an equipment depot will be $2,025,000.

Each of these combined fire-police stations as well as the four having municipal offices will occupy 1.5 acres.[4] Total acreage will be 19.5 acres for combined municipal offices.

A central town hall having meeting rooms will be included in the commercial area of the town center. No additional land will be considered necessary for this purpose. Rather space will be assumed to be available in a commercial office structure and rent paid.

A new town must provide needed services that require trucks for purposes such as public works, road repairs, garbage removal, water supplies, etc. Lacking accurate data an arbitrary amount of 20 acres, divided into four five-acre parking lots, will be assumed. Each one of these decentralized repair areas will have a garage costing $300,000 for indoor repairs.[5] Total costs for garages will be $1,200,000.

Site development costs for these depots will be calculated at $5,000 per acre. This figure is based upon the similarity between costs in depot yards and industrial parks. Total costs for these 20 acres will be $100,000. When garages are included, costs rise to $1,300,000 for site improvements and buildings.

Total costs for all municipal buildings and site development costs will be $3,325,000 for a land area of 39.5 acres. These figures are exclusive of acquisition costs.

SUMMARY

Building Type	Numbers	Cost	Land Area
Fire/Police/ Offices	13	$2,025,000	19.5 acres
Garages and Depot Areas	4	$1,300,000	20.0 acres
Totals		$3,325,000	39.5 acres

Public Buildings: Footnotes

1. Interview with George Proper, Office for Local Government, Division of Fire and Safety, Albany, August, 1969.

2. Proper; Village Dundee

3. Proper; Village Dundee

4. Done by observing existing fire stations in Albany and adding landscaping and limited parking.

5. Recent contract New York State Alfred University

Transportation

The goal of this section is to present an estimate of road acreages and costs.

The report will be limited to identifying the percentage of streets and roads in a new town. Costs will be expressed in linear miles of road. Interchanges to connect arterial highways and auxiliary items such as safety equipment, signs, street furniture, traffic lights and lighting have not been included.

This new town has been conceived as having approximately 20 percent of its total land area devoted to roads. To estimate costs an artificial but necessary street module built to arterial standards has been chosen.

Utilizing a 24 foot concrete paved road with a 60 foot right of way (ROW) the latest NYS Department of Transportation (DoT) costs for this road width is $400,000 per linear mile.[1] There are 2.9 acres in each linear mile of pavement at 24 foot widths.[2] The ROW is not being included as the town will own all of its own property that roads run through. Further ROW costs such as sidewalks are figured into housing costs per unit in a site preparation figure.

There are 1487.2 acres or 20 percent of the developed site in roads in this new town. At 2.9 acres per linear mile this gives us 513 linear miles of road. For the developed area road cost is $205,200,000.

In addition two cloverleaf interchanges will be required for this town to connect it to a major interstate or state arterial system. Each cloverleaf would occupy about 50 acres to meet Federal standards. This land area could be contained within the greenbelt.

The costs of construction for each cloverleaf would be $150,000 with a $300,000 total for both.3

Finally, road construction costs from the town to the arterial roads through the greenbelt area has to be estimated. As roadbed site would be part of the greenbelt, no extra land acquisition costs have to be estimated. If we assume a roughly circular shape for the town, distance from the edge of the developed area to the arterial highway would be about one-half mile. This half mile of road would be a four lane highway 48 feet wide, and thus equivalent to a one mile road. With two such connections to an arterial system there would be an equivalent of two miles of road construction at $400,000 per linear mile, thus totaling $800,000 for the connections from the developed area to the arterial system.

Overall roads costs would be $206,300,000.

Location	Roads in Linear Miles	Acres	Cost
Urban	513	1487.2	$205,200,000
Greenbelt	X	[50]	300,000
Greenbelt	2 miles	[11.6]	800,000
			206,300,000

Transportation: Footnotes

1. Interview with Eugene Cross, Jr., Department of Transportation, August, 1969.

2. Interview with Department of Transportation, May, 1969.

3. Interview, Cross.

Utilities

This section's objective is to identify a method that can be utilized to predict public utility costs for a new town. The technique chosen was to identify the three main components to any system; the storm and sanitary sewerage lines needed to serve a new town of 100,000 and then a treatment plant for this community. Their linear miles and treatment capacity will be determined and an average cost per linear mile of pipes and a cost per million gallons of influent presented. Finally total system costs will be summed for this system.

Calculating costs for storm sewers, catchment basins and other elements, an average pipe size of 48 inches will cost $100 per linear foot of road.[1] There will be 513 linear miles in this community. Total costs for 2,708,640 linear feet of road will be $270,864,000 to create a separate storm sewer system.

The sanitary sewage system proposal for the town will be sufficient to serve the needs of light industry. If industries with heavy pollution effluent are brought in, the sewage system would have to be rebuilt and/or cost estimates would change.

A sanitary sewage system requires approximately the same number of linear feet of pipes as does a water system. Both of these will follow the new towns road system. Using a 15 inch iron pipe at a cost of $3,500 per 1,000 linear feet, it will cost $9,480,100 for these lines.[2] Each 300 feet it will be necessary to build one manhole costing $800.[3] The 513 linear miles (2,708,640 linear feet) will have 9029 manholes costing $7,223,200. Total costs for sanitary sewer lines and manholes will be:

Sanitary sewer lines	$ 9,480,100
Manholes	7,223,200
Total Cost	$16,703,300

A tertiary stage sanitary sewerage treatment plant's capacity is calculated on the basis of the number of gallons per day of sewerage to be expected. Treatment facilities in this new town will be built to accept 150 gallons per person per day. It [currently] costs $722,222 in construction costs for each million gallons of capacity.[4] A 15,000,000 gallon treatment plant will cost $10,830,000. It will be located on 10 acres of ground including landscaping & parking lots within the greenbelt area.

Total costs for a separated storm and sanitary sewage treatment system will be as follows:

Utilities Costs: SUMMARY

Storm Sewer System	$270,864,000
Sanitary Sewage System	16,703,300
Sewage Treatment Plant	10,830,000
Total	$298,397,300

Utilities: Footnotes

1. Interview with John C. Byron, Chief, Sanitary Engineering, Office of General Services, Albany, August 7,1967.

2. Interview with John C. Byron.

3. Interview with John C. Byron.

4. "Engineering News Record" April, 1965, pp. 60-62 (+25%) inflation (cited by Kenneth Comfort in his unpublished new towns report).

Water Supplies

Planning for a new town of 100,000 persons must concern itself with the provision of water for immediate consumption as well as for fire fighting and other reserves. The impounding reservoir required this new town of 100,000 will be 4.6 acres at a depth of 10 feet. This reservoir's capacity will be 150,000,000 gallons/or 460 acre feet.[1] This is based upon a standard of 150 gallons per day per person for 100,000 people and includes commercial areas.

Actual development costs for an impounding reservoir of this size depends upon the area picked for a new town. The use of either flat terrain or a space between two hills alters costs drastically. Because of the number of these variables a cost figure cannot be adequately estimated. This being the case an arbitrary cost of $1,000,000 will be assigned to this element.

An extensive water supply system must be provided to carry the water from an impounding reservoir to individual homes, businesses, and industrial areas. In this new town twelve inch pipe will be used as an average, fire hydrants will be necessary every 500 feet with valves every 250 feet.[2]

The cost for excavation and piping will be $2,300 per 1,000 linear feet, hydrant costs are $600 each, valves $300 each.[3] The number of linear feet will equal the length of roads. There will be 2,708,640 linear feet of water mains in this new town costing $6,229,780. The 5,416 hydrants necessary to serve this town will cost $3,249,600. The new town will have 10,832 valves costing $3,249,600. Total cost for piping will be $12,728,980; total system cost will be $13,728,980.

Water Supplies Cost: SUMMARY

Type of Facility	Acres	Linear Feet	Cost
Reservoir	4.6	X	$ 1,000,000
piping	X	2,708,640	6,229,780
hydrants	X	X	3,229,600
valves	X	X	3,249,600
	4.6	2,708,640	$13,728,980

Water Supplies: Footnotes

1. Nez, George, 5.
2. Byron
3. Byron

Greenbelt

Protection of the new town from encroaching development, and preservation of its separate character with accessible open space requires establishment of a greenbelt around it. Following standards for the new towns in the London region this green belt area would constitute half again as much land as there is in the developed area.[1] With developed acreage totaling 7,431, an addition of half this amount constitutes 3,715.5 acres. Thus total new town land area will be 11,146.5 acres.

Greenbelt

1. Robin H. Best, Land for New Towns ("A Study of land uses, Densities and Agriculutral Displacement;" London, England: Town and Country Planning Association, 1964), p. 58.

Land Acquisition

This new town will purchase all of its land at one time, presumably by either buying in the open market or through the powers of eminent domain. To present as useful an example as possible the cost of land purchased has been set at $2,000 per acre.

There are 11,146.5 gross acres in this new town at $2,000 per acre. Total gross land acquisition costs will be $14,468,000.

LAND ACQUISITION COSTS SUMMARY

Cost per acre	$ 2,000
Numbers of acres	11,146.5 acres
Total costs	$ 22,292,000

TABLE I

DISTRIBUTION OF ACREAGE OF NEW TOWN ELEMENTS
BY RESIDENTIAL-NON RESIDENTIAL COMPLEXES

Type of Land Use	Residential Complex	Non-Residential	Total Area
Housing	3,310	X	3,310
Schools	476	X	476
Community Colleges		100	100
Parks	1,315	X	1,315
Cultural Facilities		10.7	10.7
Churches		83	83
Cemeteries		26	26
Health		50	50
Manufacturing		375	375
Commercial		155	155
Public Buildings		39.5	39.5
Transportation	X	1,487.2	1,487.2
Water Supplies	X	4.6	4.6
Greenbelts		3,715.5	3,715.5
Total	5,101	6,046.5	11,147.5

TABLE II

Estimated Public and Private Shares of Land Acquisition and Development Costs (In Dollars) for a New Town of 100,000 People

	Private			Public			Total
Type of Land Use	Land Acquisition	Construction and Site Development	Total	Land Acquisition	Cost & Site Development	Total	All Costs
Housing							
Sf Detached	5,600,000	507,580,000	513,180,000				513,180,000
Row	600,000	80,262,000	80,862,000				80,862,000
Multiple Family	420,000	64,260,000	64,800,000				64,680,000
Schools							
Elementary				532,000	33,600,000	34,132,000	34,132,000
Junior High				420,000	24,024,000	24,444,000	24,444,000
Senior High					18,480,000	18,480,000	18,480,000
Community College				200,000	16,020,000	16,220,000	16,220,000
Parks							
Tot Lots				130,000	650,000	780,000	780,000
Playgrounds				300,000	1,500,000	1,800,000	1,800,000
Neighborhood Playfields				400,000	2,000,000	2,400,000	2,400,000
Community Parks				300,000	1,500,000	1,800,000	1,800,000
Golf Courses				700,000	3,500,000	4,200,000	4,200,000
				800,000	1,600,000	2,400,000	2,400,000
Cultural Facilities							
Churches	165,000	43,680,000	43,845,000	21,400	2,888,000	12,909,400	12,909,400
							43,845,000

TABLE II -- Continued

Estimated Public and Private Shares of Lanc Acquisition and Development Costs (In Dollars) for a New Town of 100,000 People

	Private			Public			Total
Type of Land Use	Land Acquisition	Construction and Site Development	Total	Land Acquisition	Cost & Site Development	Total	All Costs
Cemeteries	52,000	52,000	104,000				104,000
Health							
Clinics				20,000	19,840,000	19,860,000	19,860,000
Hospitals				80,000	16,000,000	16,080,000	16,080,000
Employment							
Industrial	750,000	53,272,000	54,022,000				54,022,000
Commercial	310,000	29,098,680	29,408,680				29,408,680
Public Buildings				79,000	3,325,000	3,404,000	3,404,000
General Services							
Transportation				2,974,400		2,974,400	2,974,400
Roads					206,300,000	206,300,000	206,300,000
Interchanges				[200,000]	300,000	300,000	300,000
Utilities							
Waste Treatment Plant & Seperated Sewer Systems				20,000	299,397,000	299,417,000	299,397,000
Water Supply				9,200	13,728,980	13,738,180	13,738,180
Reservoir System							
Greenbelt				7,431,000		7,431,000	7,431,000
Total Costs	7,897,000	778,204,680	786,101,000	14,417,000	674,652,980	684,569,980	1,470,670,980

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